Design and Development of EFFICIENT ENERGY SYSTEMS

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Preface

The objective of this edition is to provide a broad view of the fundamental concepts of green energy technology and applications in a concise way for fast and easy understanding. This book provides information regarding almost all the aspects to make it highly benefi-cial for all students, researchers and teachers of this field. Fundamental principles of green energy technology with the latest developments are discussed in a clear and detailed manner with explanatory diagrams wherever necessary. The book focuses on the basic concepts of Internet of Things (IoT) in power conversion, IoT in renewable energy, and adoption of machine learning, low-power device and circuit design including the latest research available depending upon the technological changes based upon their application.

Chapter Organization

Chapter 1 deals with prefabrication low-power device design and analysis on Visual TCAD device simulator with graphical and programming interfaces. Also, the chapter discusses the design of device-based low-power memory and biomedical applications.

Chapter 2 mainly describes Vedic multiplication based on the compressor block that is focused on the reduction of interconnect wire. The multiplier is implemented using Verilog HDL with cadence NC SIM and the constrain areas, power and delay optimize using underlying block.

Chapter 3 deals with gas leakage detection from drainage to offer safety for sanitary workers from gases such as Carbon monoxide (CO), Hydrogen sulphide (H2S), and

Methane (CH4), which are some of the hazardous gases present in underground drainage systems.

Chapter 4 presents a smart healthcare system development with machine learning, which is energy efficient, with reduced network latency and minimum bandwidth.

Chapter 5 This chapter presents some of the solutions in literature for implementing security. The chapter also covers different types of attacks such as goal-oriented attack, performer-oriented attack and layer-oriented attack.

Chapter 6 addresses the energy-saving component and the application of digital technology and Internet of Things (IoT) in large-scale process industries.

Chapter 7 discuss the method deployed relay node in such a way that the network will behave like a sensor network with the help of K-Means clustering approach.

Chapter 8 analyzes an MLI fed Induction Motor Drive by considering Solar Energy as a source. The effects of employing various types of MLI for a PV source-based drive, and methods of deriving maximum drive efficiency are elaborated in this chapter with sufficient simulation results.

Chapter 9 describes energy storage systems using a universal controller that can work for a wide range of voltage to both DC and AC loads with high power rating and low power loss.

Chapter 10 explores energy arrangement producers, energy financial analysts, and directors with a review of the job of IoT in enhancement of energy frameworks.

Chapter 11 focuses on integration of photovoltaic cell, wind energy and other forms of renewable energy. It also

covers microgrid systems with high reliability, less transmission losses and improved power system efficiency.

Chapter 12 describes state-of-the-art renewable energy systems and highlights the global efforts being made to increase their efficiency.

Chapter 13 is dedicated to Internet of Things (IoT) technologies with best solutions, ease of the task of monitoring and analysis that opens up a wide range of prospects for making better future decisions.

Chapter 14 examines new security challenges in the Internet of Things (IoT) using machine learning algorithm and the system of interrelated computing devices for its quick development and distribution that are essential for internet and smart device users.

Chapter 15 presents a working and solution process, an illustrative fuzzily defined mathematical framework for optimizing food quality. Here, the emphasis is not only on ensuring fruit safety but also avoiding foodborne diseases.

Chapter 16 is an overview of the various requirements for Internet of Things (IoT) systems and architectures, highlighting different research challenges and security issues connected with IoT.

Chapter 17 presents a state-of-the-art of FinFET technology with low power consumption and their application in a low-power VLSI circuit.

Chapter 18 proposes a single-source high step-up switched-capacitor-based 19-level inverter topology with enhanced power quality that can be extended by addition of switched-capacitor units. The extended topology can produce larger gain and voltage steps.